

Chapter VIII – Potential Modal Diversions



Diversion Analysis Methodology

Diversion estimates were based on:

- Length of haul
 - A truck mileage matrix was developed for internal and external trip “centroids”
 - Survey data on intermodal preferences were used to assign divertability indices to distance categories
- Commodity modal shares
 - Major HDT commodities were identified
 - US and SCAG region modal shares were compared to create indices for greater rail and intermodal shares
- Length of haul and commodity indices were combined to estimate diversion percentages by regional pair, commodity, and mode

HDT Truck Data Methodology

Data files from the SCAG Heavy-Duty Truck Model were used to estimate the truck traffic that could be diverted to rail.

Ideally, the approach to estimating truck VMT would be to identify those commodities that are competitive for rail service and O-D pairs by Transportation Analysis Zone (TAZ). Unfortunately, the data in the SCAG files make this analysis impractical. All of the preparation of truck trip tables in the SCAG input files is done by spreadsheet. Additionally, there are over 5,000 TAZs in the network, almost 40 commodity groups, and 11 external regions. This yields a 200,000-by-11 matrix that would need to be multiplied cell-by-cell by a 5000-by-11 matrix (the TAZ centroid to external cordon values) in order to estimate VMT.

As an alternative to the TAZ-level approach, a simplified approach operating on county-to-county data was performed. From the SCAG truck model input files, spreadsheets with tonnages and truck trips by commodity to each external region were created for each of the following internal SCAG regions:

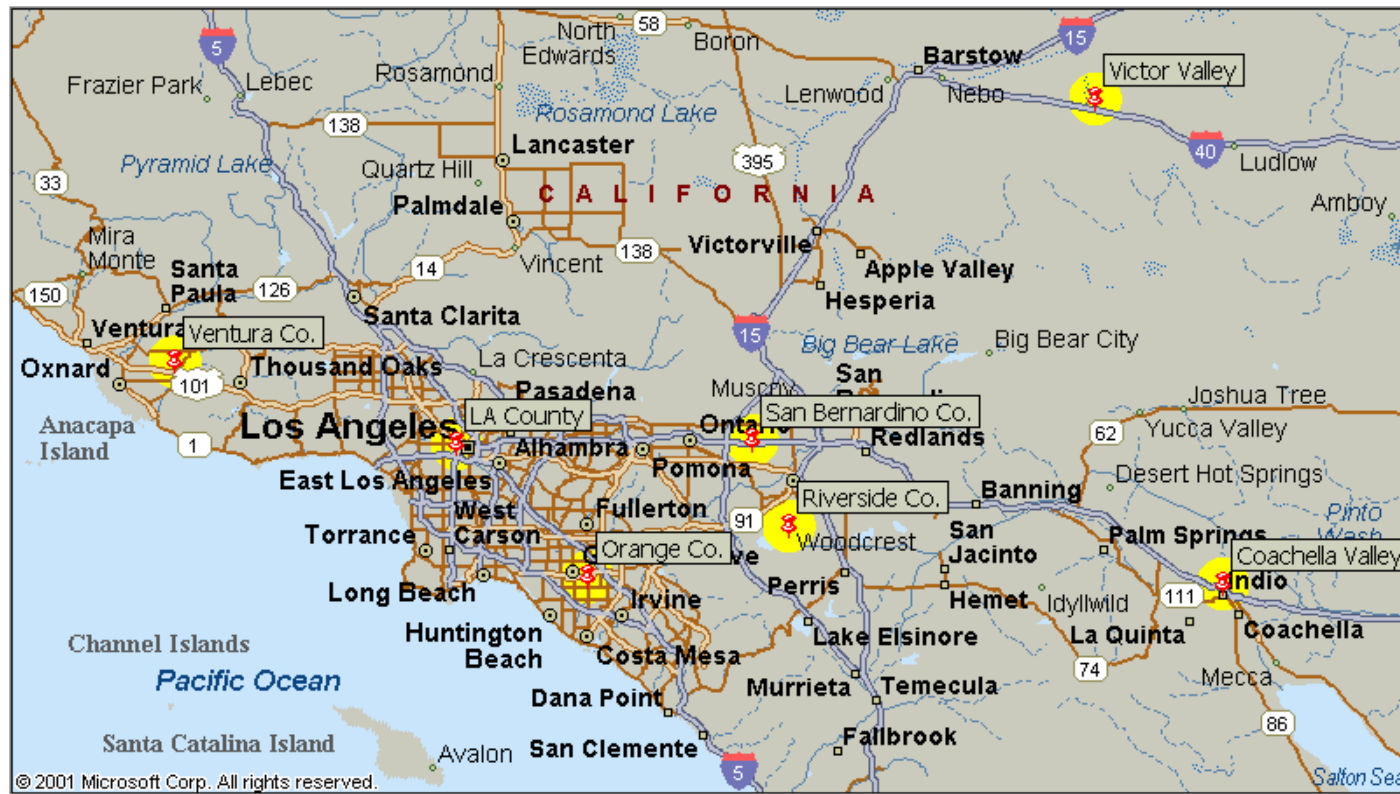
- Los Angeles County
- Orange County
- Ventura County
- the urbanized portion of Riverside County
- the urbanized portion of San Bernardino County
- Coachella Valley
- Victor Valley

Tonnages were further disaggregated into truckload (TL) and less than truckload (LTL) values for each commodity to external region. From these spreadsheets, commodities that are not likely to ship by rail along with any external regions that were too close to the SCAG region to represent a viable market for rail hauls were removed from the spreadsheet.

Truck Flow Mileage Matrix

- Truck mileage distance for each diverted trip was estimated as the distance from the centroid of each internal region to each external cordon. Employment centroids, rather than geographic centroids, were used to better estimate distances from truck-generating activities.

Exhibit 97: SCAG Region Centroids

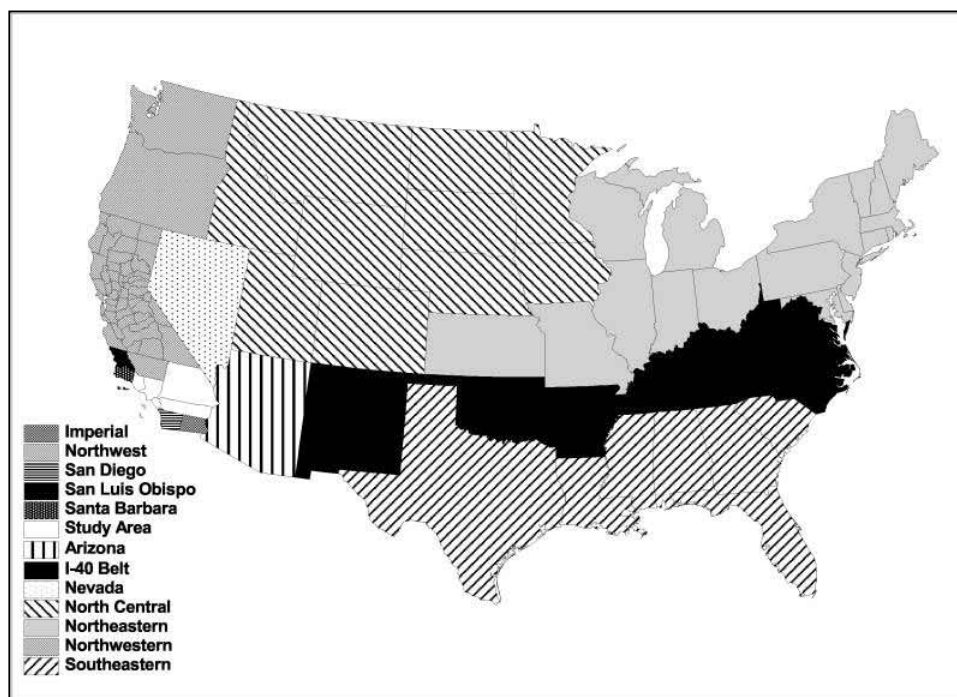


External Truck Trips

- In the truck model, all of the external truck trips are assigned to an external region. External regions are defined as counties inside California and states outside of California. The rationale for the structure for these external regions is that all of the components of a region are accessed by the same set of routes leading out of and into the SCAG region. These external regions are highly aggregated except in the cases of counties and states that are very close to the SCAG region. There are 11 external regions representing the entire United States, as shown below.

In cases where there is a single route that would be used to access a given external region, all of the truck trips generated by the model to and from that external region are assigned to a single external cordon (i.e., a roadway at the boundary of the region). In cases where multiple routing options are available, the truck trips are allocated to each major route (i.e. external cordon) in proportion to the amount of truck traffic carried by each route (from Caltrans truck count data). This allocation is accomplished after the commodity flows are converted to truck trips.

Exhibit 98: External Truck Trip Regions



Truck Flow Mileage Matrix

External regions were assigned representative city “centroids”

Exhibit 99: External City Centroids



Truck Flow Mileage Matrix

- Average distances from rail facilities to cordons were also calculated for each internal region. Distances were based on existing nearby rail facilities for each internal region. Mileages and driving times were obtained for each combination.

Exhibit 100: Truck Flow Mileage Matrix

External Region: Analysis Market Point: Distance/Driving Hours:	Local				Short-Haul						Long-Haul							
	Kern		SR14		Nevada		Arizona		I-5 North		I-10		I-40		I-15		I-15 or I-40	
	Bakersfield		Lancaster		Las Vegas		Phoenix		Sacramento		Dallas		Memphis		Minneapolis		Columbus	
	Miles	Hours	Miles	Hours	Miles	Hours	Miles	Hours	Miles	Hours	Miles	Hours	Miles	Hours	Miles	Hours	Miles	Hours
SCAG County/Area & "Centroid"																		
Los Angeles (Los Angeles: I-10/I-110))	112	2.0	80	1.5	285	4.5	388	6.5	402	6.5	1,461	23.0	1,812	28.5	1,944	30.5	2,268	35.5
Orange (Santa Ana, 103 S. Harbor Blvd.)	150	2.5	108	2.0	270	4.5	373	6.0	422	6.5	1,445	22.5	1,797	28.0	1,929	30.0	2,252	35.0
Riverside (Riverside: Markham St & Mockingbird Cyn Rd.)	172	3.0	99	2.0	247	4.0	336	5.5	443	7.0	1,408	22.0	1,774	28.0	1,906	30.0	2,230	35.0
San Bernardino (Fontana, I-10 & Citrus Ave)	160	2.5	87	2.0	236	4.0	325	5.0	453	7.0	1,398	21.5	1,763	27.5	1,895	29.5	2,219	34.5
Ventura (Camarillo, US 101)	118	2.0	86	1.5	321	5.5	424	7.0	407	6.5	1,496	23.5	1,848	29.0	1,980	31.0	2,304	36.0
Coachella Valley (Indio: I-10 at Indio Blvd.)	234	3.5	147	2.5	294	4.5	249	4.0	506	8.0	1,322	20.5	1,716	26.5	1,954	30.5	2,171	33.5
Victor Valley (Newberry Springs; I-10)	148	3.0	115	2.0	144	2.5	368	6.0	437	7.5	1,303	21.5	1,664	26.0	1,809	28.5	2,120	33.0

**Local-
Very Low
Diversion**

**Short Haul-
Moderate
Diversion**

**Long Haul-
Higher
Diversion**

Intermodal Mileage Diversion Indices

- Intermodal “users” rated intermodal service higher than non-users in each mileage block
- Intermodal users gave higher market shares to intermodal than the overall average
- The two indices were combined to create a divertability index by mileage block

Exhibit 101: Intermodal Usage Indices

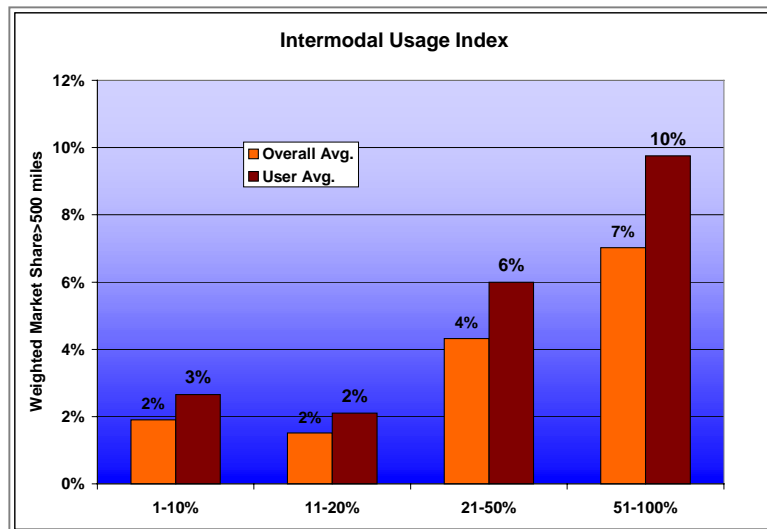


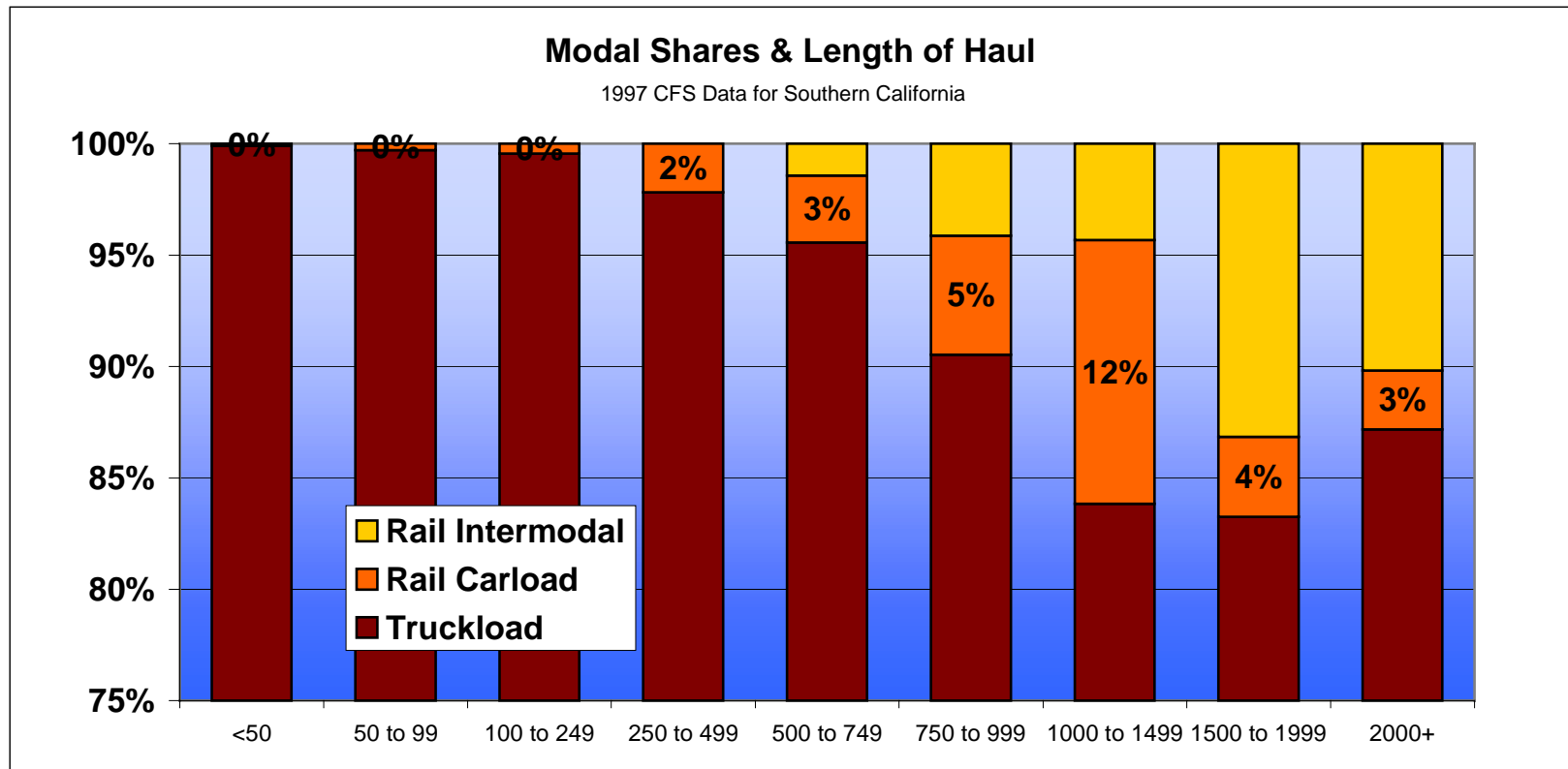
Exhibit 102: Intermodal Index Performance Ratios

1993 Intermodal Index Performance Ratios				
		Mileage		
		500	1000	2000
Users				
	IM	38%	67%	79%
	Truck	87%	82%	76%
	Ratio (IM/Truck)	44%	82%	104%
Non-Users				
	IM	29%	50%	59%
	Truck	85%	84%	75%
	Ratio (IM/Truck)	34%	60%	79%
User/Nonuser Ratio		1.28	1.37	1.32

Transloading Distance Index

Existing modal shares were used to gauge the probability of diversion in each mileage block

Exhibit 103: Modal Shares and Length of Haul



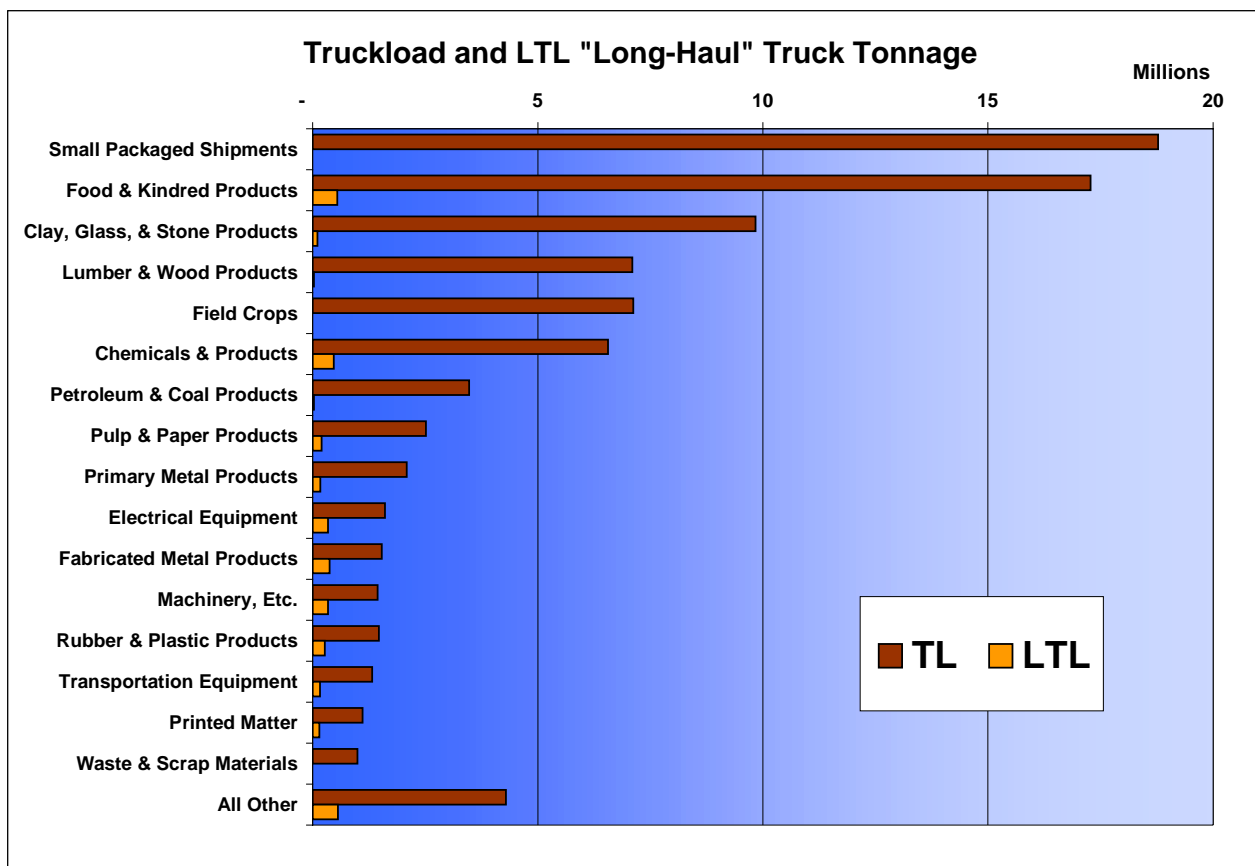
Commodity Diversion Potential

- The 19 major HDT commodities over 500,000 tons each were assessed for rail and intermodal divertability. In the absence of the vast resources necessary to examine even a majority of the individual flows, and acknowledging the fragmentary nature of the available data, the study team constructed a series of divertability indexes as proxies. A comparison of CFS national modal shares and estimated SCAG modal shares was used as a divertability index.
 - Where national (CFS) rail or intermodal shares were higher than SCAG region shares, it was assumed – other things being equal – that there existed the potential for further diversions of SCAG region flows.
 - Where national rail or intermodal shares were lower, it was assumed – other things being equal – that the potential for further diversions in the SCAG region was small.
- Separate indexes were compiled for:
 - Truckload to intermodal
 - LTL to intermodal
 - TL to rail/transload
- The commodity-specific indexes were combined with the mileage-based indexes to yield a consolidated index of divertability that roughly reflected both commodity and demographic variables.

“Long-Haul” Truck Commodities

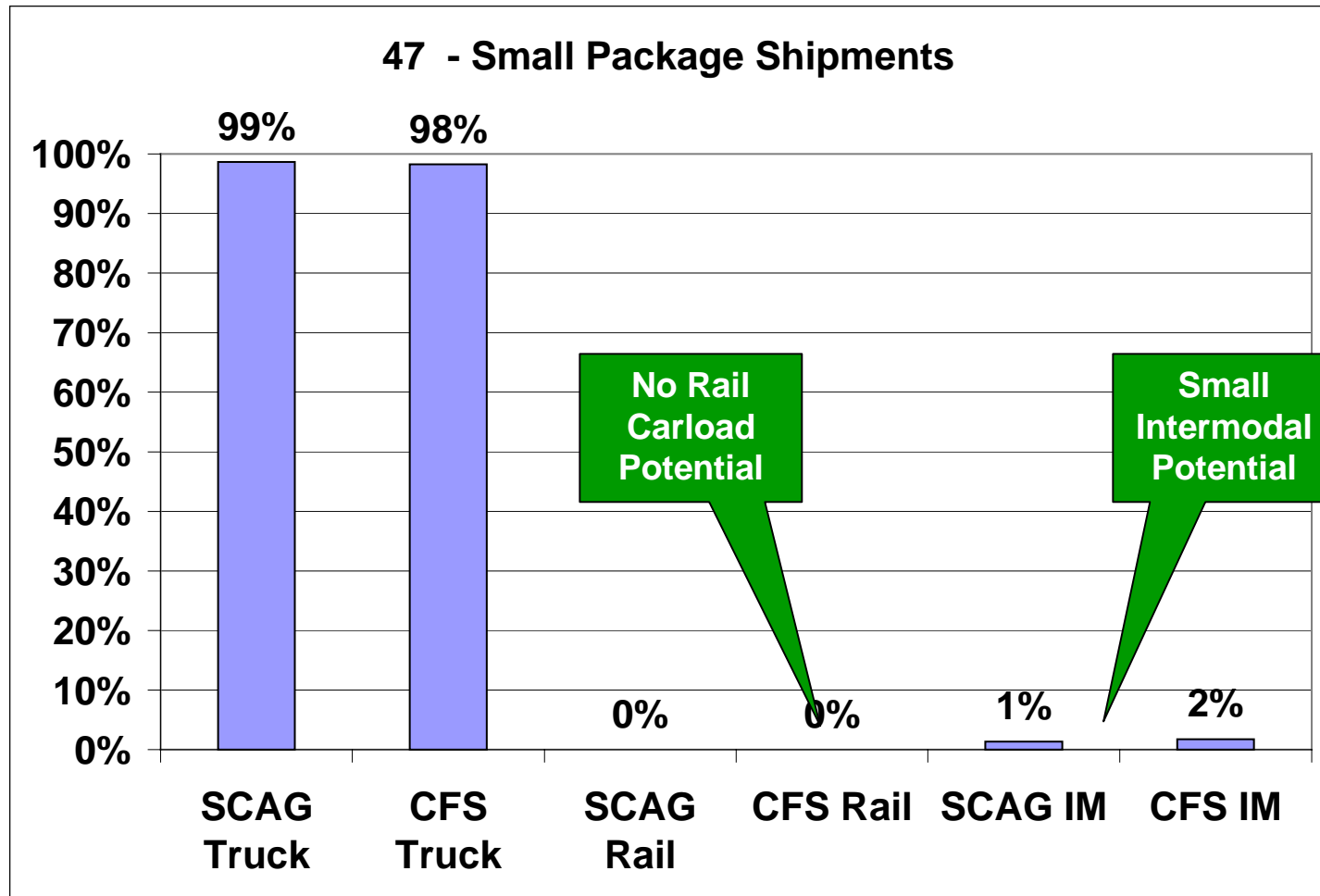
The chart below shows the 19 major commodity groups in year 2000 HDT data for the SCAG region

Exhibit 104: Long-Haul Truck Commodities



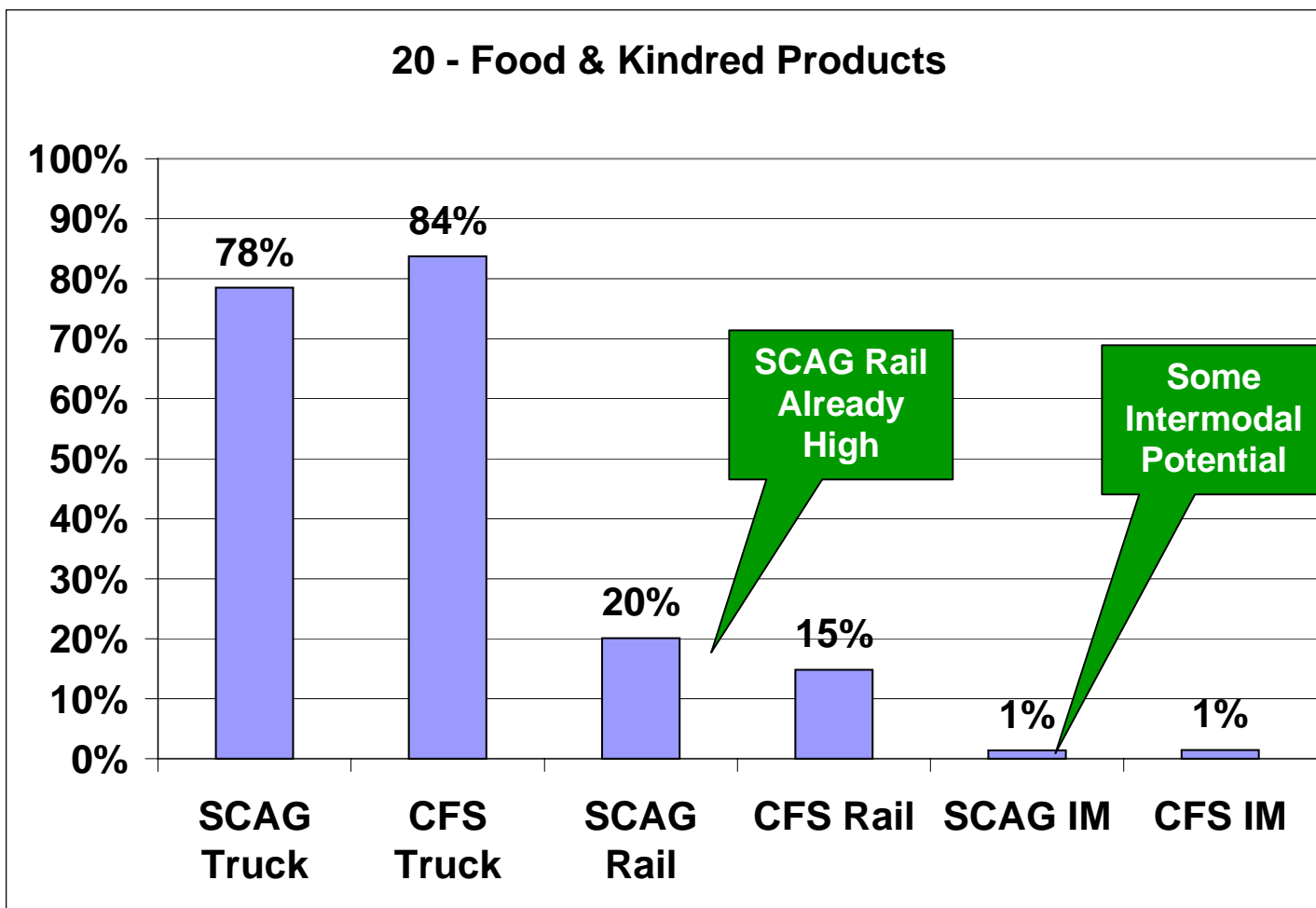
Commodity Diversion Potential

Exhibit 105: Diversion Potential, Small Package Shipments



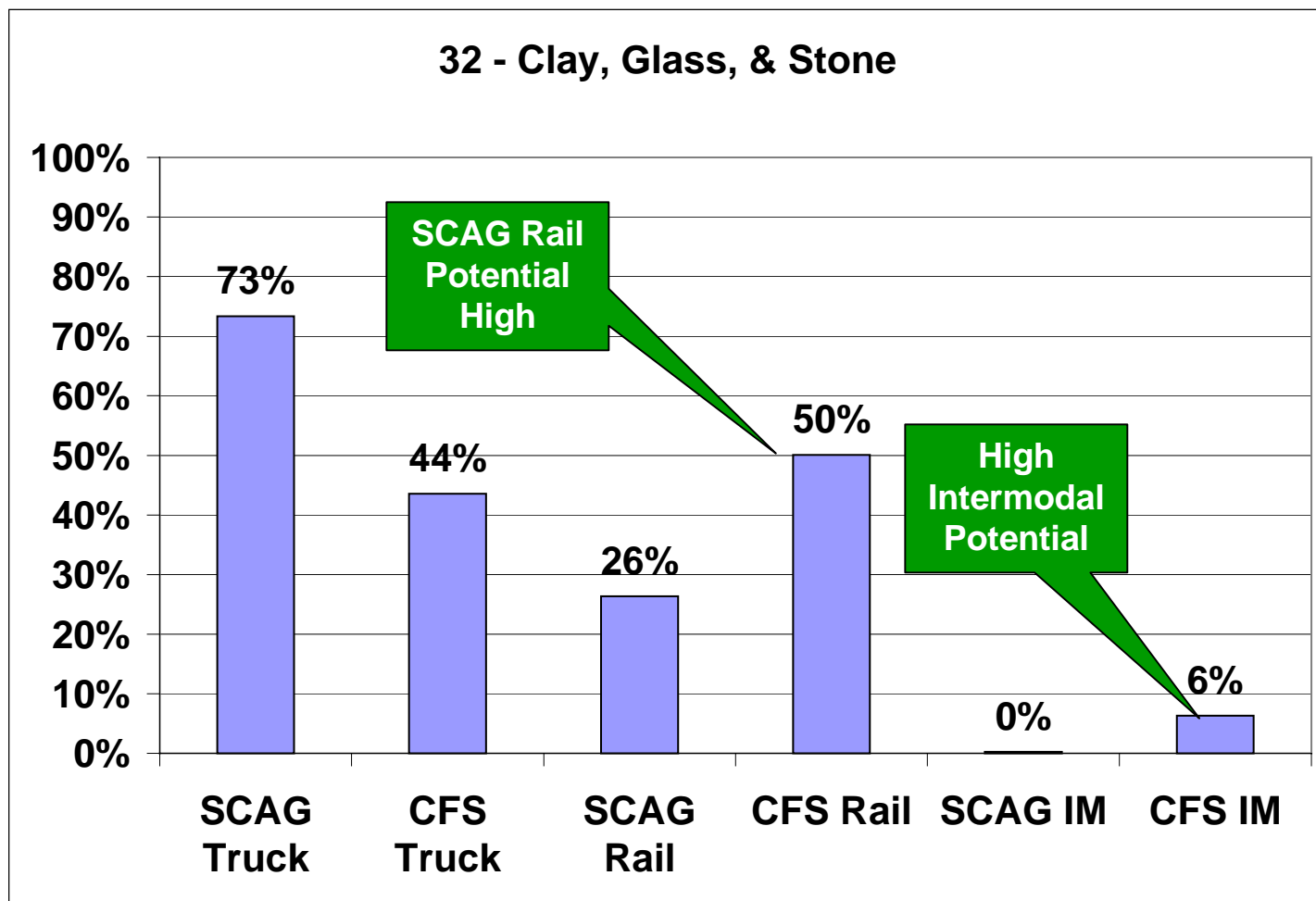
Commodity Diversion Potential

Exhibit 106: Diversion Potential, Food & Kindred Products



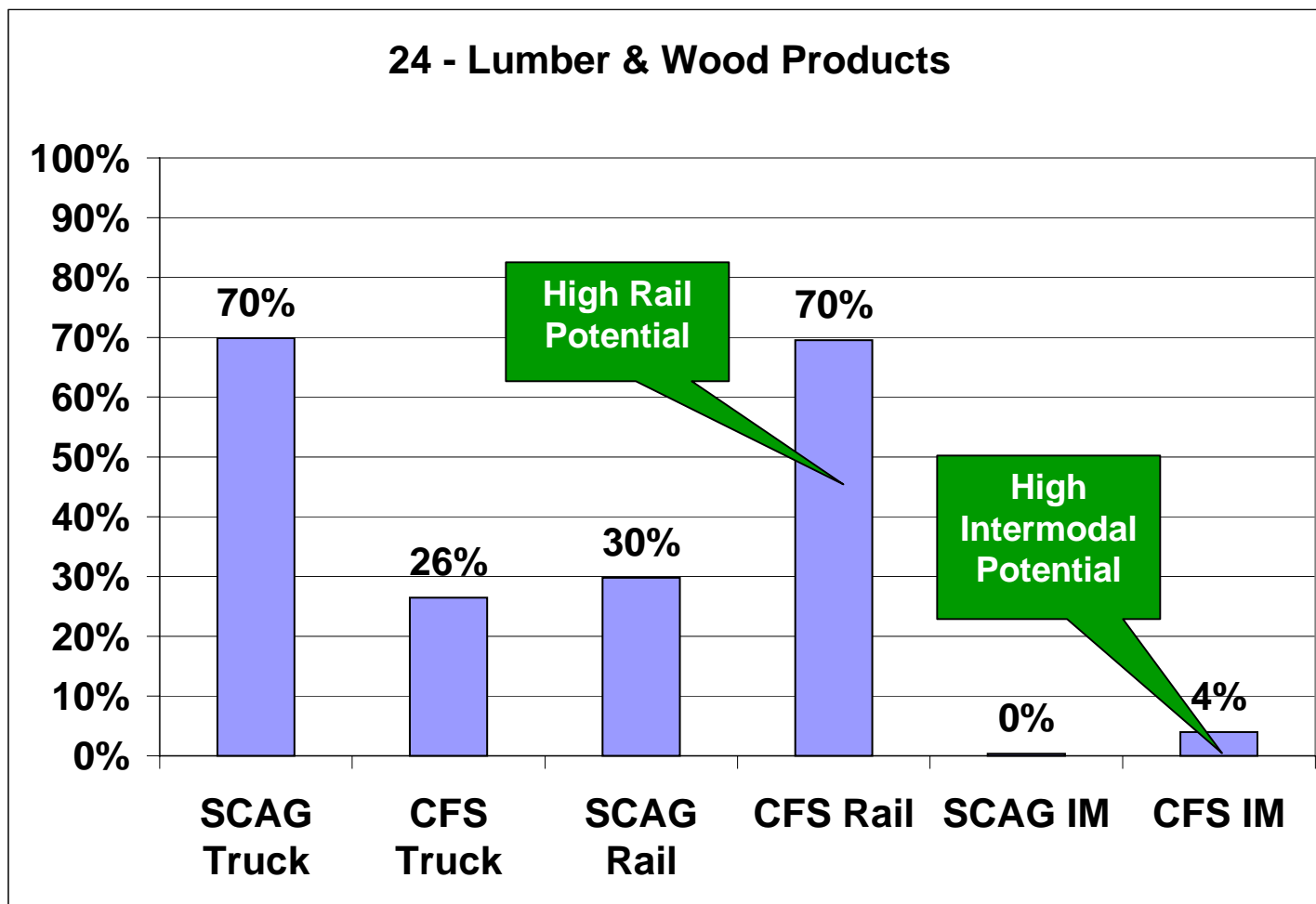
Commodity Diversion Potential

Exhibit 107: Diversion Potential, Clay, Glass, & Stone



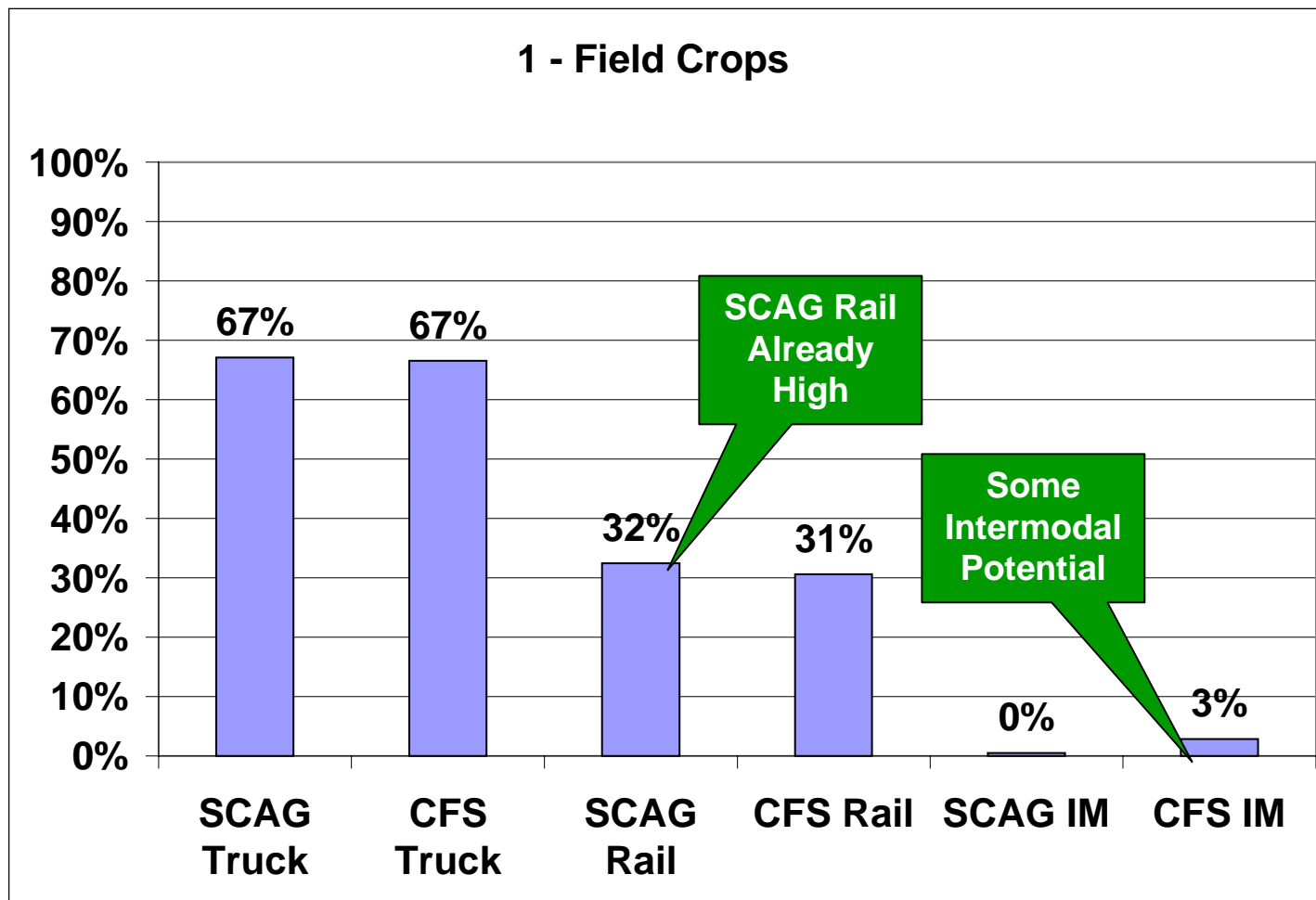
Commodity Diversion Potential

Exhibit 108: Diversion Potential, Lumber & Wood Products



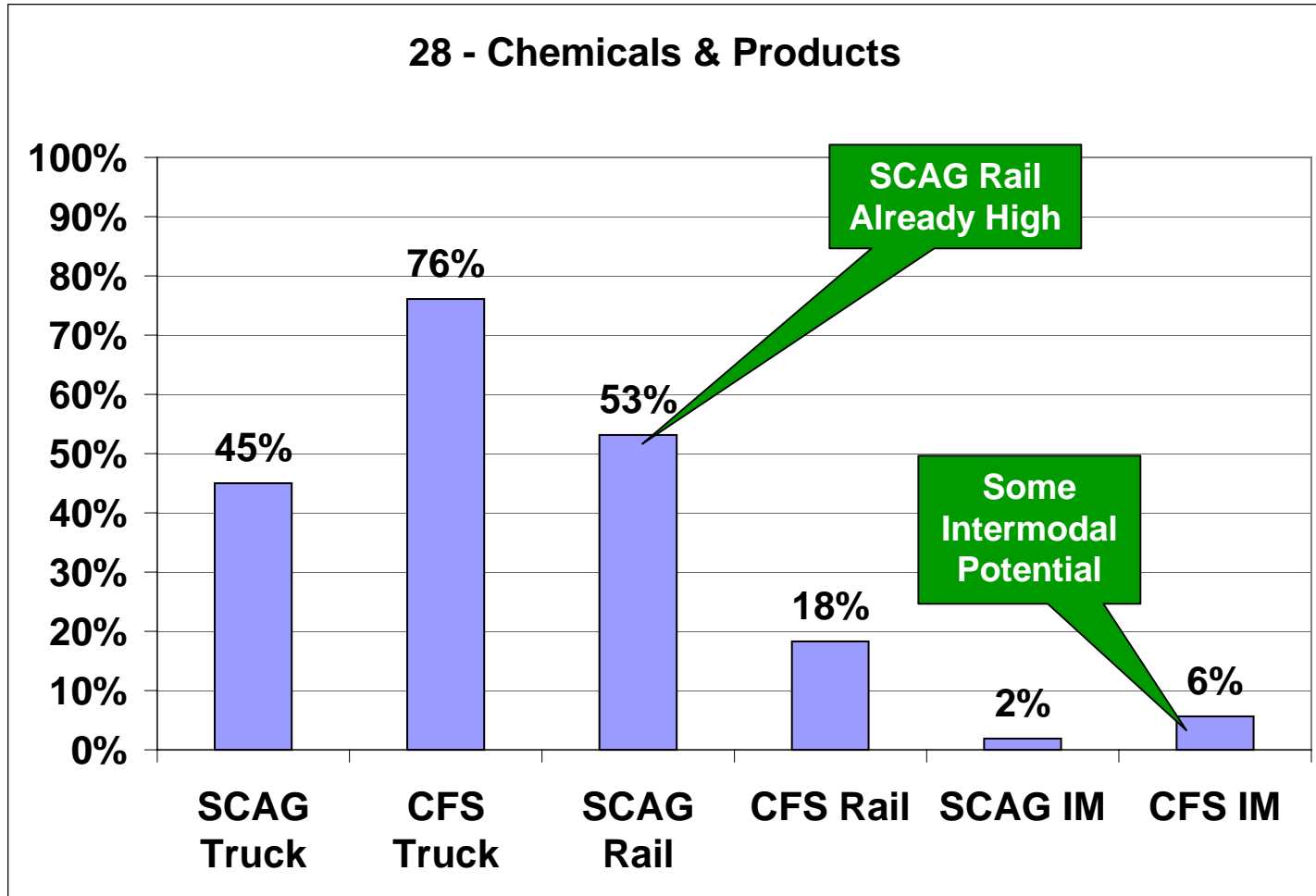
Commodity Diversion Potential

Exhibit 109: Diversion Potential, Field Crops



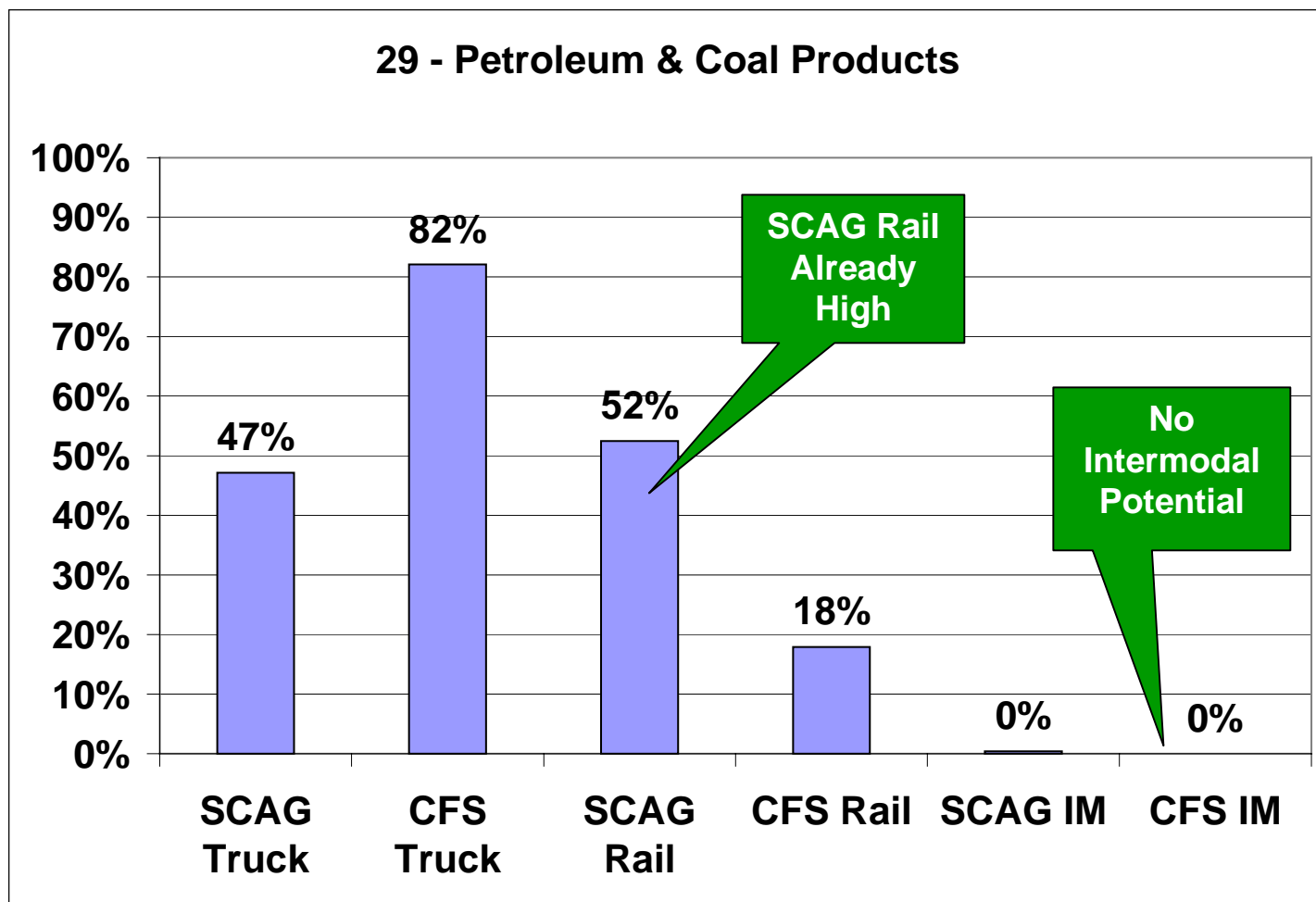
Commodity Diversion Potential

Exhibit 110: Diversion Potential, Chemicals & Products



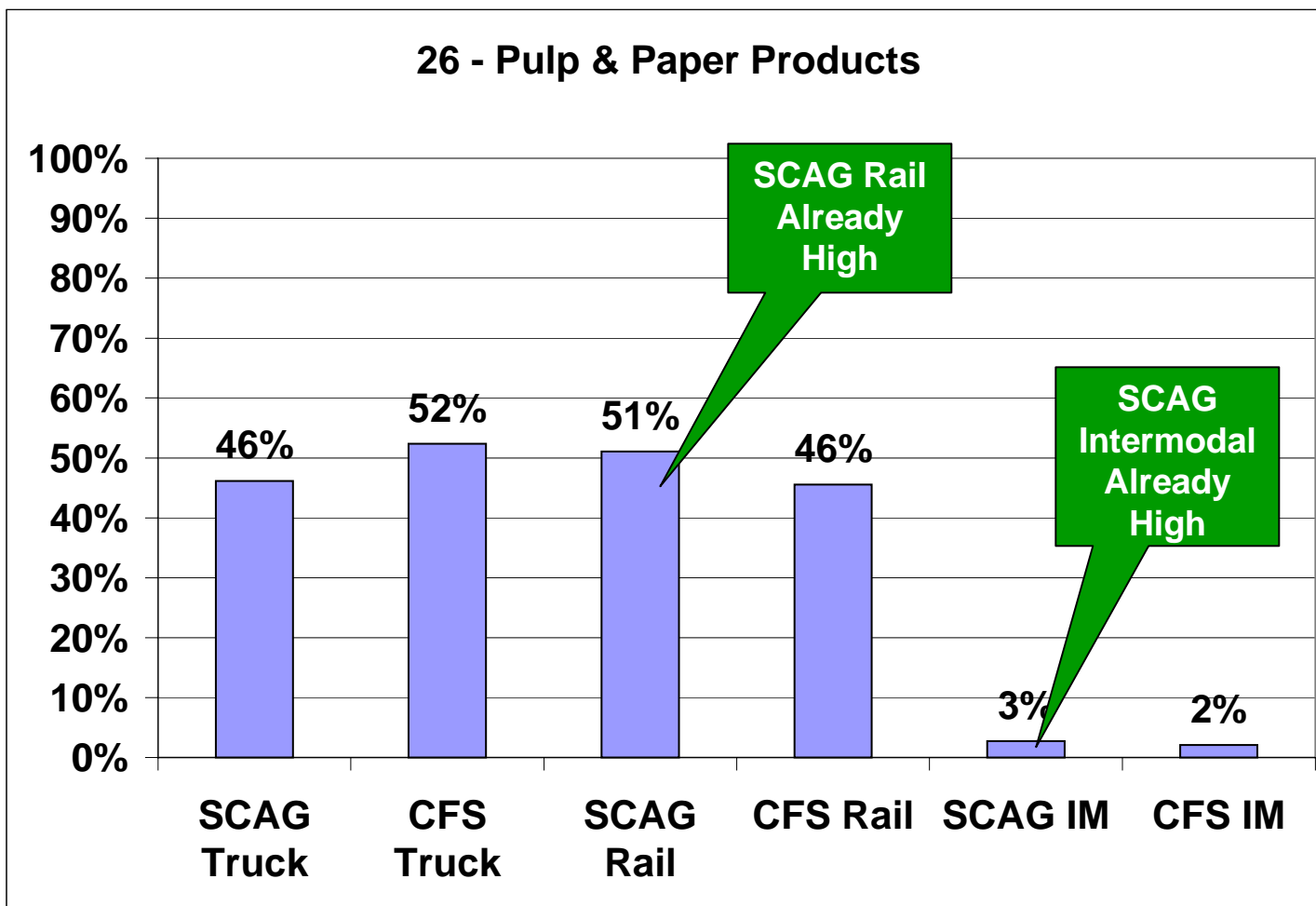
Commodity Diversion Potential

Exhibit 111: Diversion Potential, Petroleum & Coal Products



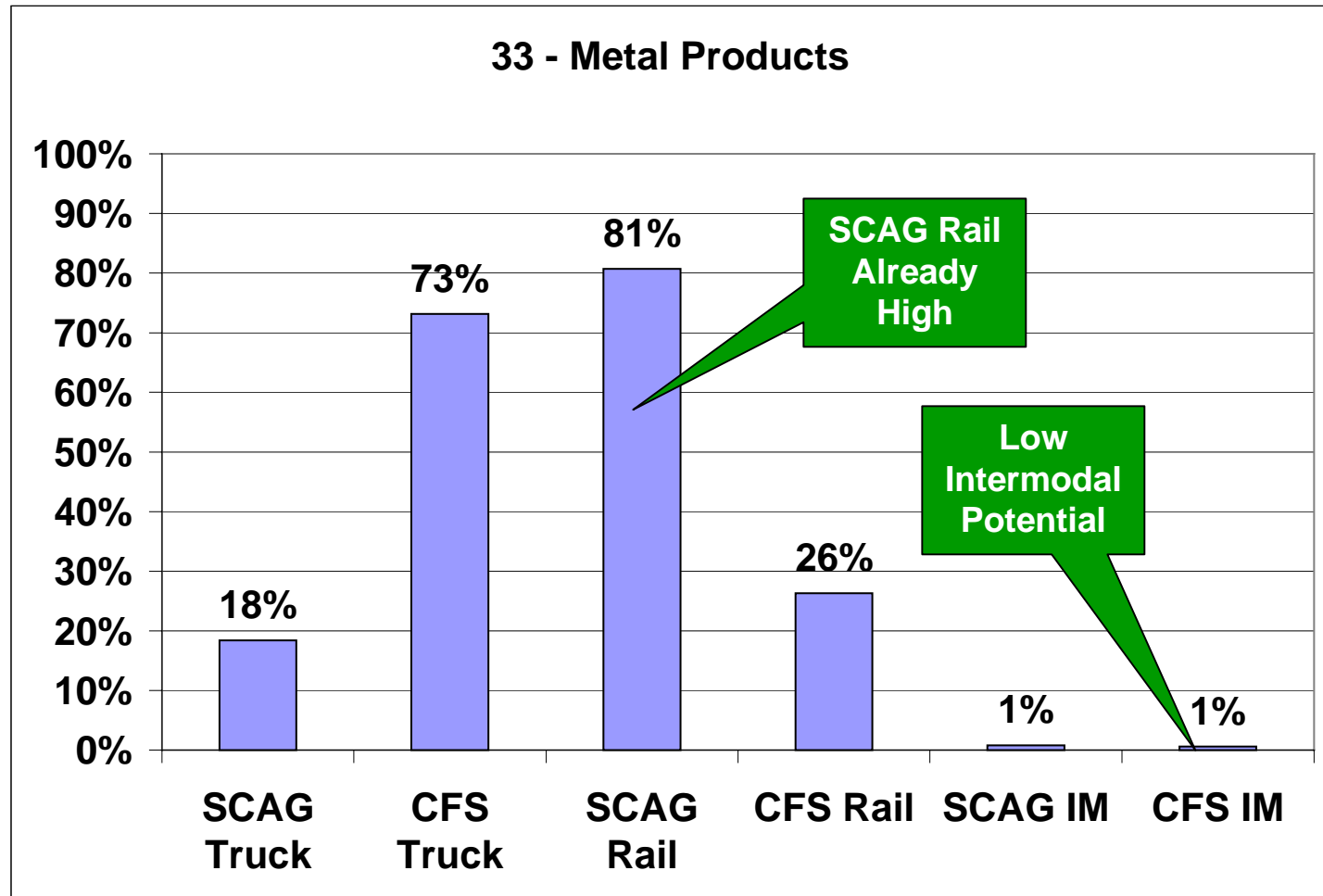
Commodity Diversion Potential

Exhibit 112: Diversion Potential, Pulp & Paper Products



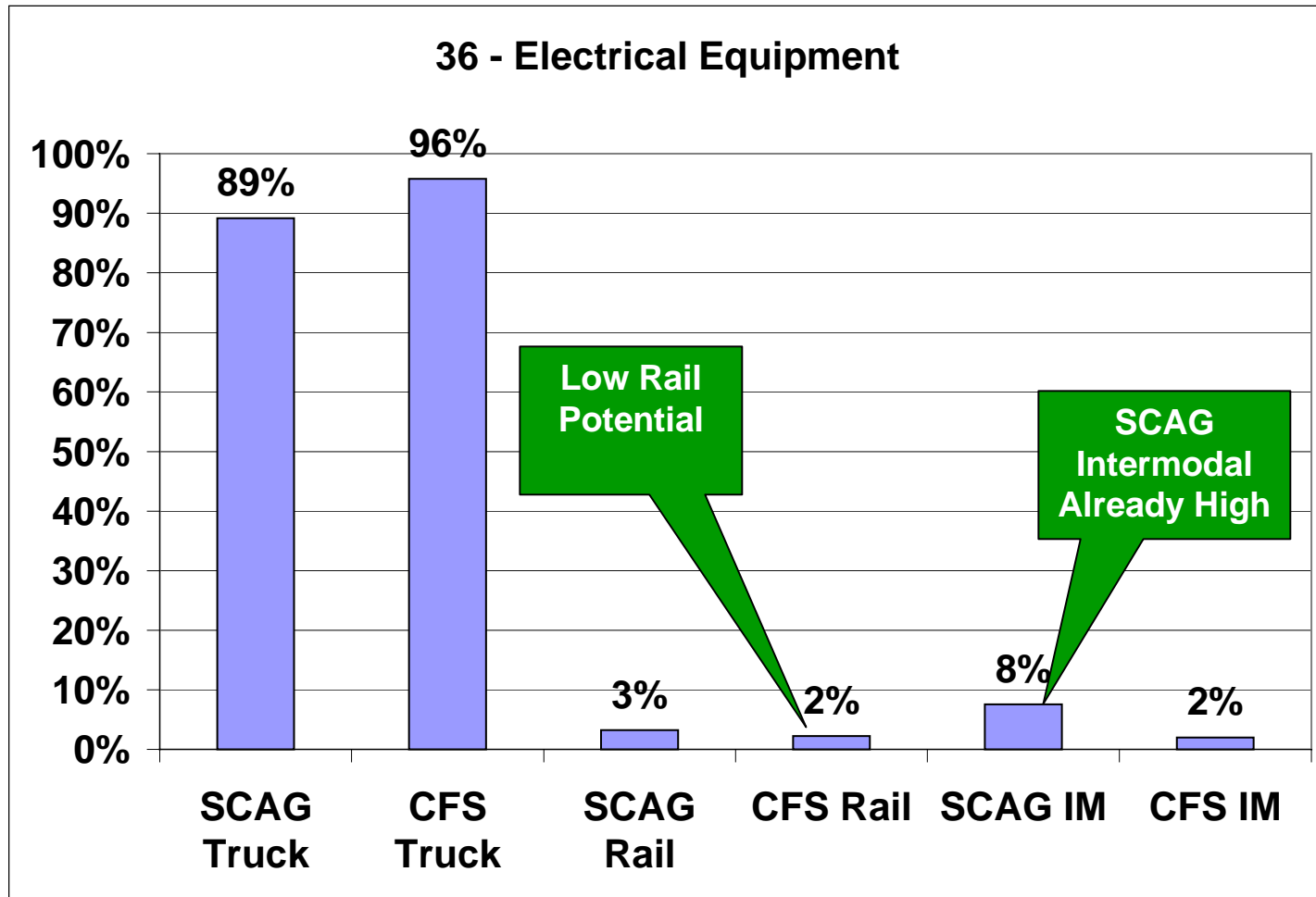
Commodity Diversion Potential

Exhibit 113: Diversion Potential, Metal Products



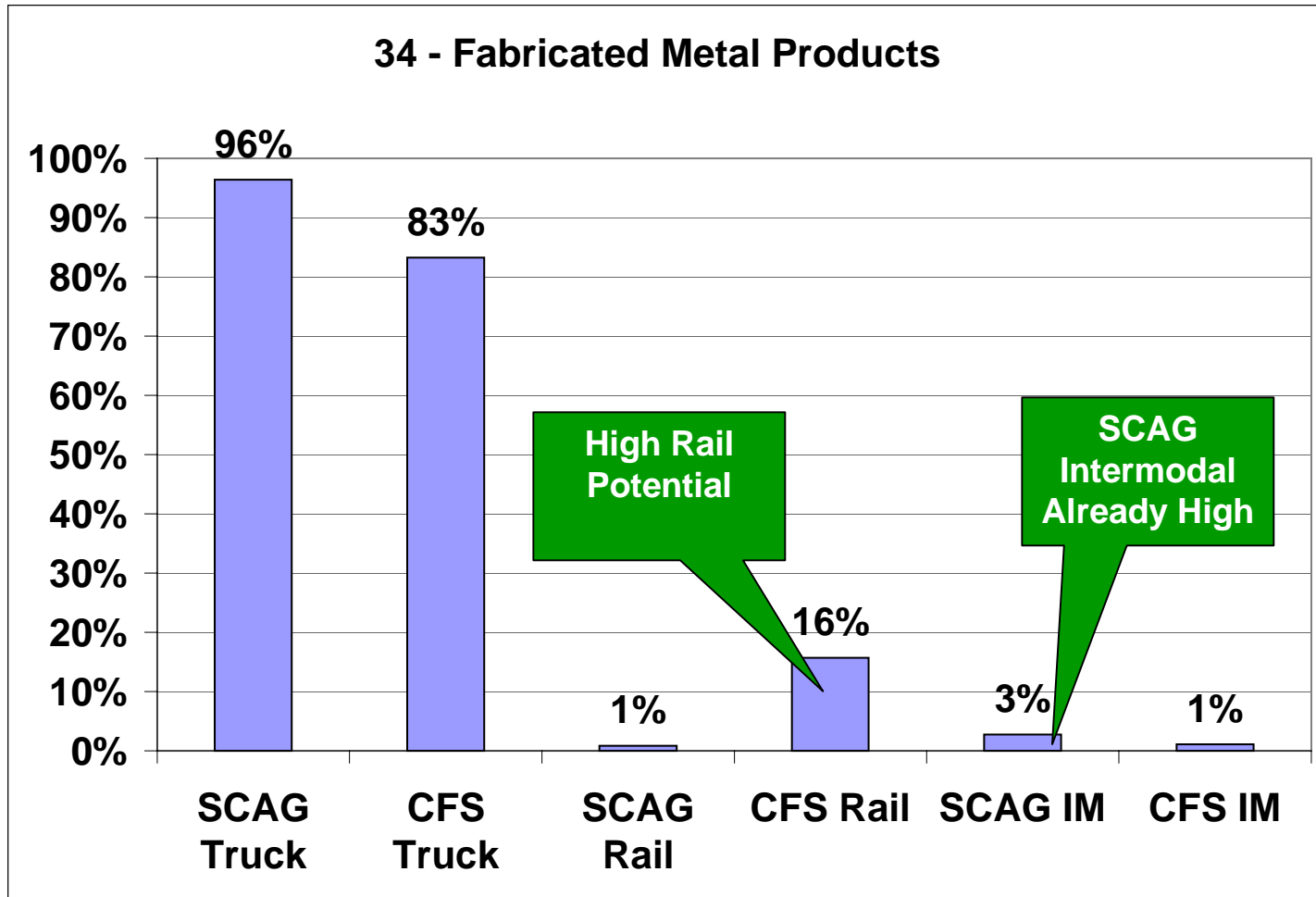
Commodity Diversion Potential

Exhibit 114: Diversion Potential, Electrical Equipment



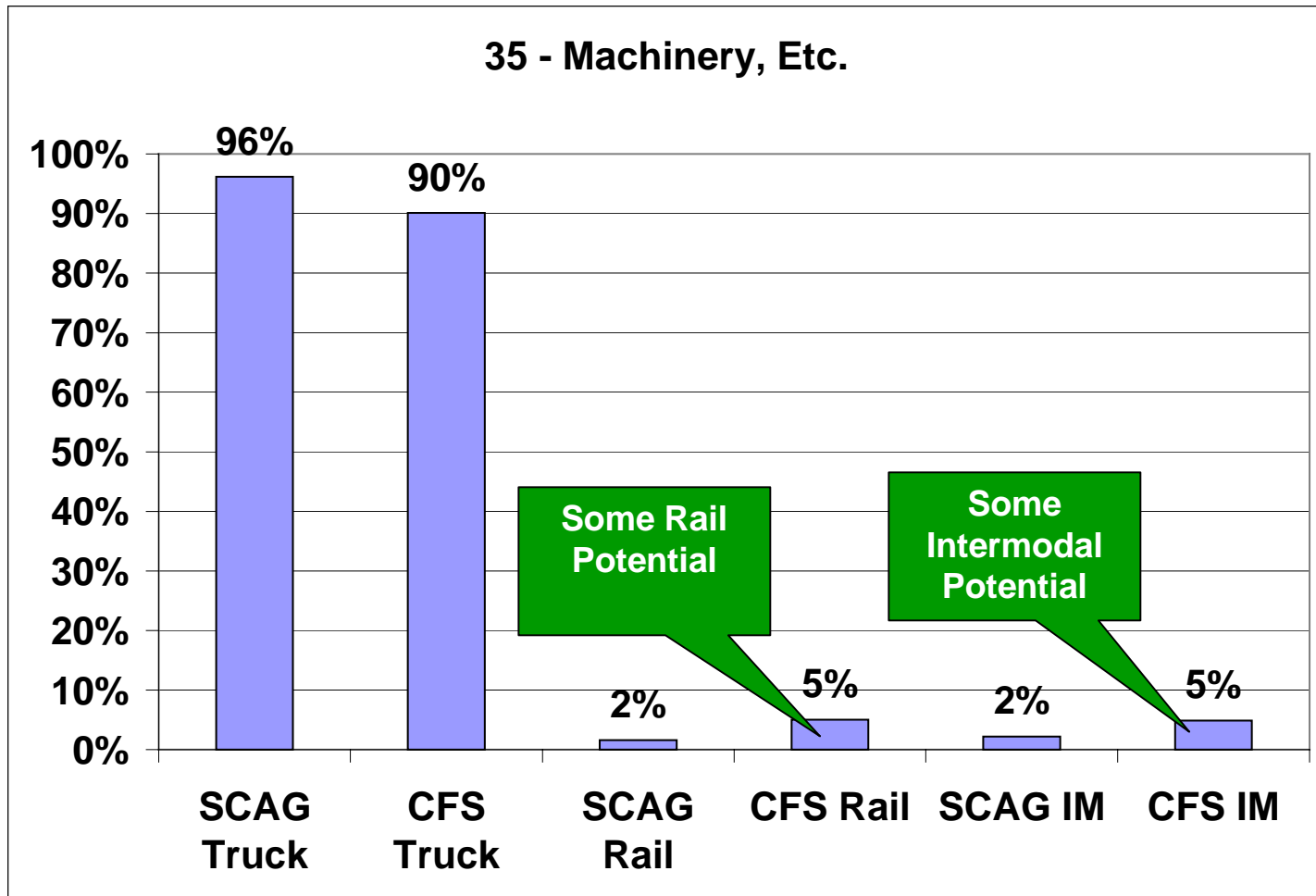
Commodity Diversion Potential

Exhibit 115: Diversion Potential, Fabricated Metal Products



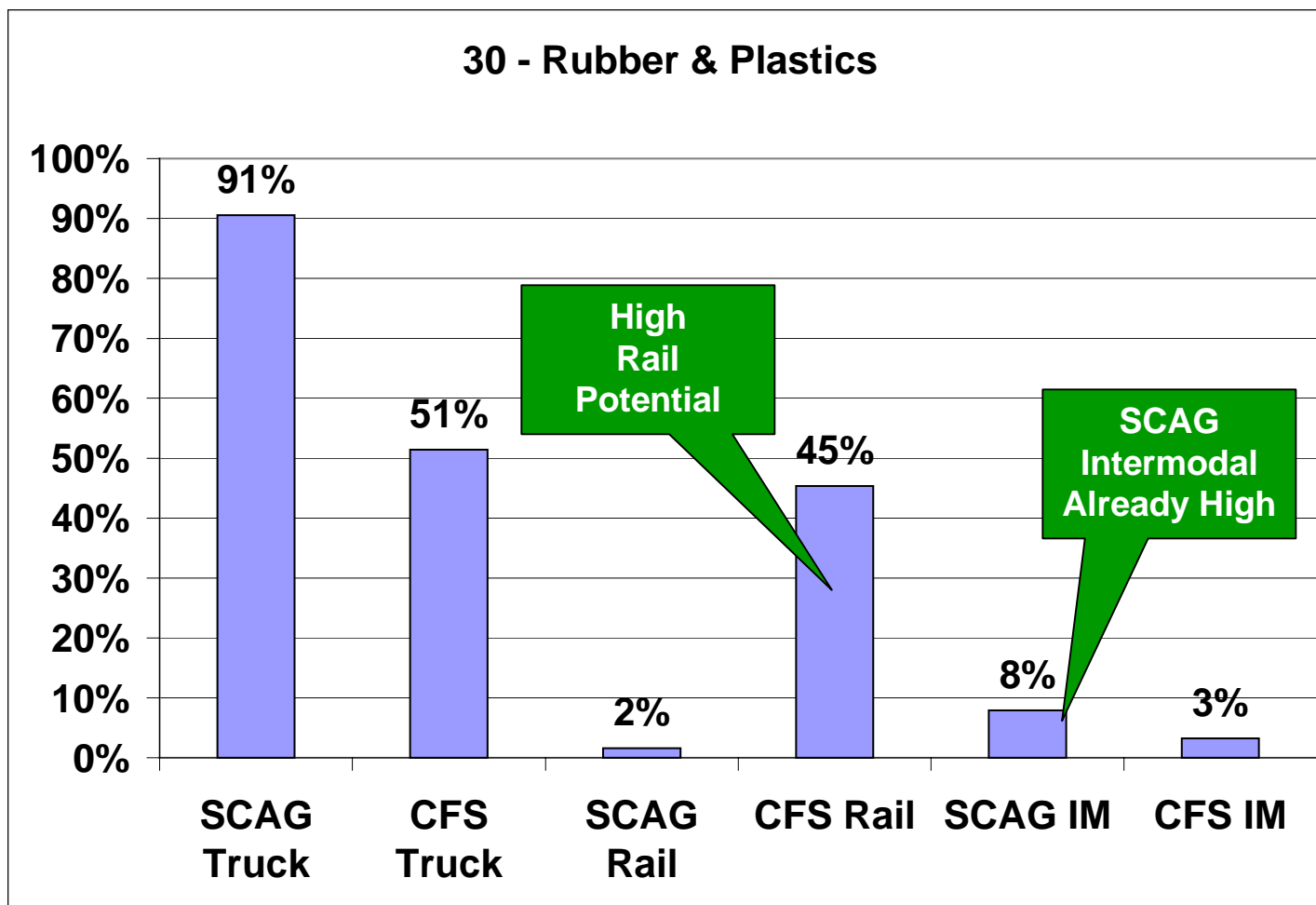
Commodity Diversion Potential

Exhibit 116: Diversion Potential, Machinery, Etc.



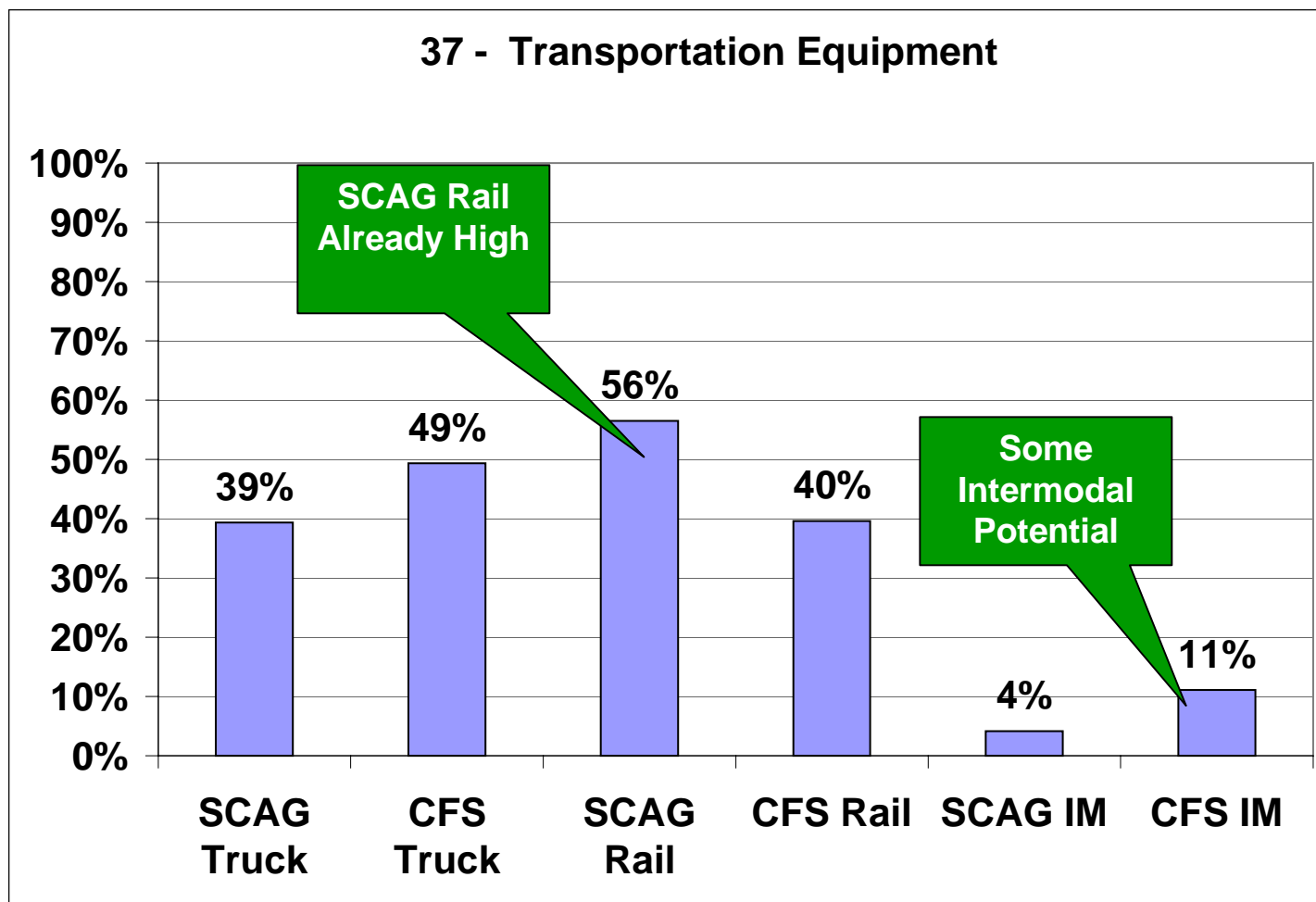
Commodity Diversion Potential

Exhibit 117: Diversion Potential, Rubber & Plastics



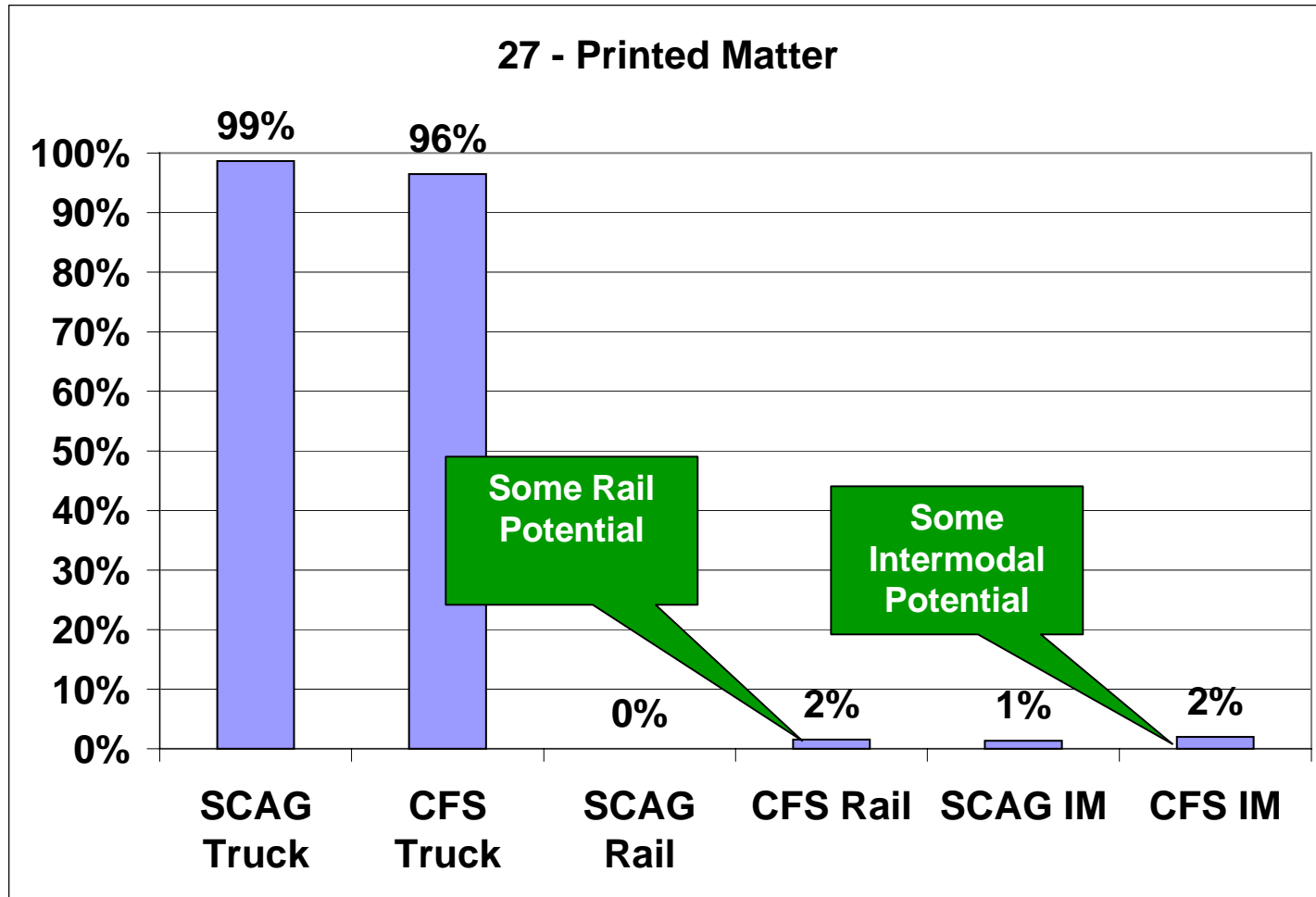
Commodity Diversion Potential

Exhibit 118: Diversion Potential, Transportation Equipment



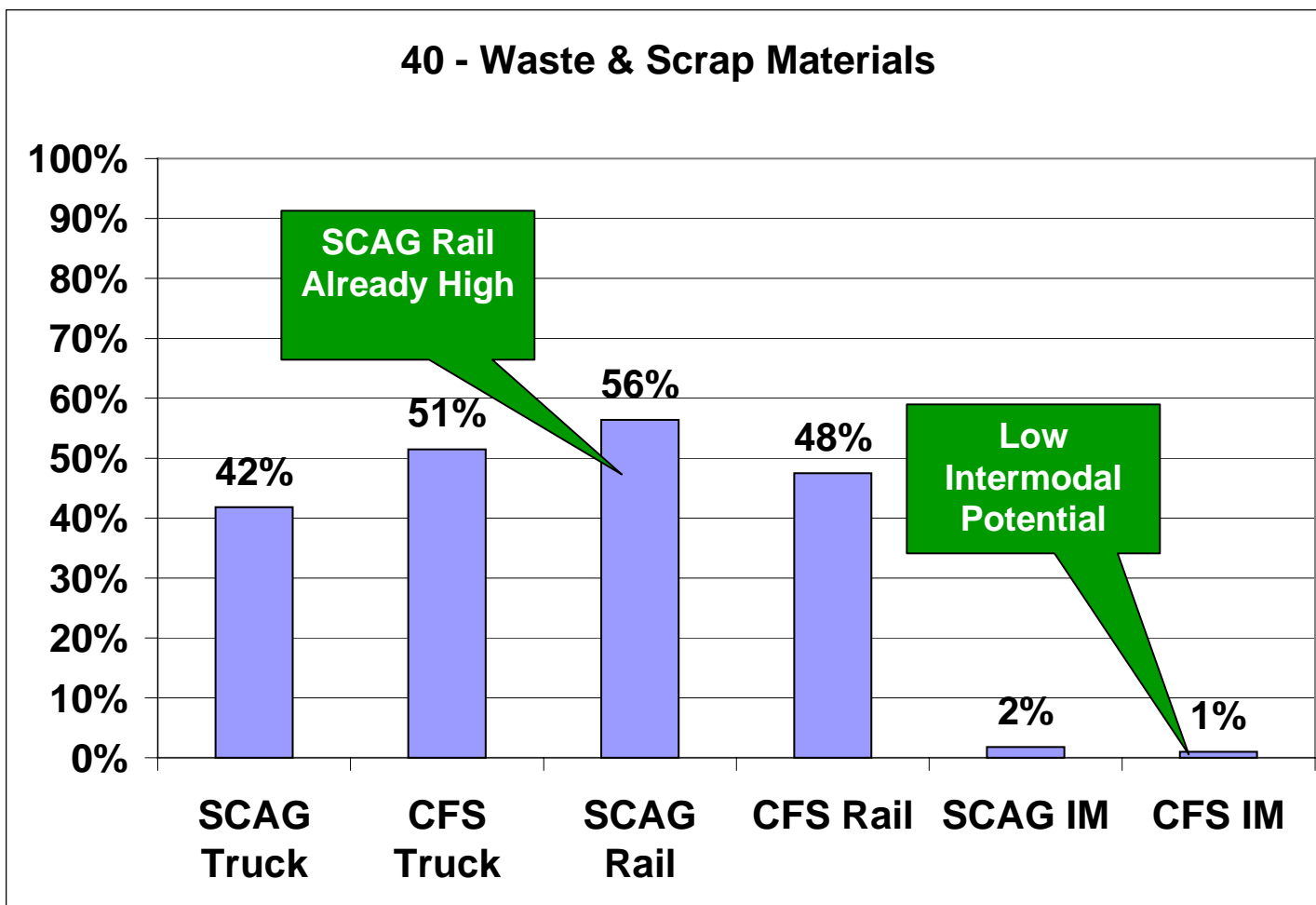
Commodity Diversion Potential

Exhibit 119: Diversion Potential, Printed Matter



Commodity Diversion Potential

Exhibit 120: Diversion Potential, Waste & Scrap Materials



Year 2000 Annual Intermodal Diversion Estimates

- The study team developed an order-of-magnitude estimate for the potential year 2000 diversion from trucks to intermodal transportation using the methodology described earlier. The potential diversion could be on the order of 1.6 million annual tons, the equivalent of roughly 72,000 annual truckloads.
- The largest potential diversions were found in the I-5 corridor, which is by far the most heavily traveled truck route. Realizing these potential diversions would require successful intermodal service to Northern California – a relatively short haul – and the route to the Pacific Northwest.

Exhibit 121: Annual Intermodal Diversion Estimates, Year 2000

SCAG Region	Annual Tons Diverted by Cordon Point					Totals
	I-5 North	SR14	I-15 North	I-10	I-40	
Los Angeles Co.	539,956	1,620	254,399	99,115	38,760	933,850
Orange Co.	272,211	643	67,028	22,959	8,306	371,146
Ventura Co.	26,790	36	11,426	7,295	1,749	47,296
Riverside Co.	68,769	127	16,984	7,501	2,961	96,343
San Bernardino Co.	56,334	119	20,794	12,500	3,116	92,863
Victor Valley	22,983	24	8,624	4,375	1,204	37,211
Coachella Valley	13,012	147	13,574	3,168	1,165	31,066
Total	1,000,056	2,717	392,829	156,913	57,260	1,609,774

SCAG Region	Annual Trucks Diverted by Cordon Point					Totals
	I-5 North	SR14	I-15 North	I-10	I-40	
Los Angeles Co.	24,201	61	11,846	4,491	1,905	42,503
Orange Co.	10,765	23	3,245	1,145	419	15,597
Ventura Co.	1,156	1	545	370	84	2,156
Riverside Co.	3,255	5	840	375	153	4,629
San Bernardino Co.	2,433	4	994	573	157	4,162
Victor Valley	988	1	405	199	59	1,651
Coachella Valley	607	5	628	150	51	1,441
Total	43,406	100	18,501	7,303	2,828	72,139

Year 2000 Daily Intermodal Diversion Estimates

- The potential intermodal diversions would be the rough equivalent of 230 trucks per day, more than half of which would come from Interstate 5. While this sounds like a significant body of traffic, in fact the reduction in truck traffic on major freeways would be barely noticeable.

Exhibit 122: Daily Intermodal Diversion Estimates, Year 2000

SCAG Region	Average Daily Tons Diverted by Cordon Point					Totals
	I-5 North	SR14	I-15 North	I-10	I-40	
Los Angeles Co.	1,725	5	813	317	124	2,984
Orange Co.	870	2	214	73	27	1,186
Ventura Co.	86	0	37	23	6	151
Riverside Co.	220	0	54	24	9	308
San Bernardino Co.	180	0	66	40	10	297
Victor Valley	73	0	28	14	4	119
Coachella Valley	42	0	43	10	4	99
Total	3,195	9	1,255	501	183	5,143

SCAG Region	Average Daily Trucks Diverted by Cordon Point					Totals
	I-5 North	SR14	I-15 North	I-10	I-40	
Los Angeles Co.	77	0	38	14	6	136
Orange Co.	34	0	10	4	1	50
Ventura Co.	4	0	2	1	0	7
Riverside Co.	10	0	3	1	0	15
San Bernardino Co.	8	0	3	2	1	13
Victor Valley	3	0	1	1	0	5
Coachella Valley	2	0	2	0	0	5
Total	139	0	59	23	9	230

Year 2000 Annual Rail Diversion Estimates

- The study team estimated potential rail carload diversions through transloading at almost 2 million tons annually, or the equivalent of almost 90,000 truckloads.
- Again, the largest diversions would come in the I-5 corridor, where UP and its predecessor SP have both had carload service initiatives designed to encourage such diversions.

Exhibit 123: Annual Rail Diversion Estimates, Year 2000

SCAG Region	Annual Tons Diverted by Cordon Point					Totals
	I-5 North	SR14	I-15 North	I-10	I-40	
Los Angeles Co.	474,183	265	214,248	424,797	61,829	1,175,322
Orange Co.	207,887	91	47,217	84,067	17,701	356,962
Ventura Co.	29,523	6	11,867	41,633	2,316	85,345
Riverside Co.	72,539	22	18,961	33,362	4,415	129,299
San Bernardino Co.	61,160	21	20,368	57,365	4,538	143,451
Victor Valley	21,057	3	7,938	20,455	1,838	51,292
Coachella Valley	13,569	24	8,915	14,921	1,677	39,107
Total	879,918	432	329,513	676,600	94,314	1,980,778

SCAG Region	Annual Trucks Diverted by Cordon Point					Totals
	I-5 North	SR14	I-15 North	I-10	I-40	
Los Angeles Co.	21,424	10	9,968	19,054	2,948	53,403
Orange Co.	8,344	3	2,233	3,841	854	15,276
Ventura Co.	1,293	0	575	2,101	112	4,081
Riverside Co.	3,559	1	944	1,565	226	6,295
San Bernardino Co.	2,741	1	967	2,606	224	6,538
Victor Valley	941	0	376	934	91	2,341
Coachella Valley	655	1	413	689	75	1,833
Total	38,956	16	15,476	30,789	4,530	89,767

Year 2000 Daily Rail Diversion Estimates

The estimated, order-of-magnitude rail/transload diversions would be the equivalent of about 287 daily trucks

Exhibit 124: Daily Rail Diversion Estimates, Year 2000

SCAG Region	Average Daily Tons Diverted by Cordon Point					Totals
	I-5 North	SR14	I-15 North	I-10	I-40	
Los Angeles Co.	1,515	1	684	1,357	198	3,755
Orange Co.	664	0	151	269	57	1,140
Ventura Co.	94	0	38	133	7	273
Riverside Co.	232	0	61	107	14	413
San Bernardino Co.	195	0	65	183	14	458
Victor Valley	67	0	25	65	6	164
Coachella Valley	43	0	28	48	5	125
Total	2,811	1	1,053	2,162	301	6,328

SCAG Region	Average Daily Trucks Diverted by Cordon Point					Totals
	I-5 North	SR14	I-15 North	I-10	I-40	
Los Angeles Co.	68	0	32	61	9	171
Orange Co.	27	0	7	12	3	49
Ventura Co.	4	0	2	7	0	13
Riverside Co.	11	0	3	5	1	20
San Bernardino Co.	9	0	3	8	1	21
Victor Valley	3	0	1	3	0	7
Coachella Valley	2	0	1	2	0	6
Total	124	0	49	98	14	287

Year 2000 Annual Combined Diversion Estimates

- The combined intermodal and rail transload diversions could reach roughly 3.6 million tons at year 2000 traffic levels, or the annual equivalent of about 162,000 trucks.

Exhibit 125: Annual Combined Diversion Estimates, Year 2000

SCAG Region	Annual Tons Diverted by Cordon Point					Totals
	I-5 North	SR14	I-15 North	I-10	I-40	
Los Angeles Co.	1,014,139	1,885	468,647	523,912	100,589	2,109,173
Orange Co.	480,097	734	114,244	107,026	26,007	728,108
Ventura Co.	56,313	42	23,293	48,928	4,064	132,641
Riverside Co.	141,308	149	35,945	40,863	7,376	225,641
San Bernardino Co.	117,494	140	41,162	69,865	7,653	236,314
Victor Valley	44,041	27	16,562	24,830	3,042	88,502
Coachella Valley	26,581	171	22,489	18,089	2,842	70,173
Total	1,879,974	3,149	722,342	833,513	151,574	3,590,552

SCAG Region	Annual Trucks Diverted by Cordon Point					Totals
	I-5 North	SR14	I-15 North	I-10	I-40	
Los Angeles Co.	45,624	71	21,814	23,545	4,853	95,907
Orange Co.	19,109	27	5,478	4,986	1,273	30,873
Ventura Co.	2,448	2	1,120	2,471	196	6,237
Riverside Co.	6,814	6	1,784	1,940	379	10,923
San Bernardino Co.	5,174	5	1,960	3,179	382	10,700
Victor Valley	1,929	1	780	1,133	149	3,993
Coachella Valley	1,262	6	1,041	839	126	3,274
Total	82,362	117	33,977	38,092	7,358	161,906

Year 2000 Daily Combined Diversion Estimates

The daily combined equivalent would be about 517 trucks across all cordon points.

Exhibit 126: Daily Combined Diversion Estimates, Year 2000

SCAG Region	Average Daily Tons Diverted by Cordon Point					Totals
	I-5 North	SR14	I-15 North	I-10	I-40	
Los Angeles Co.	3,240	6	1,497	1,674	321	6,739
Orange Co.	1,534	2	365	342	83	2,326
Ventura Co.	180	0	74	156	13	424
Riverside Co.	451	0	115	131	24	721
San Bernardino Co.	375	0	132	223	24	755
Victor Valley	141	0	53	79	10	283
Coachella Valley	85	1	72	58	9	224
Total	6,006	10	2,308	2,663	484	11,471

SCAG Region	Average Daily Trucks Diverted by Cordon Point					Totals
	I-5 North	SR14	I-15 North	I-10	I-40	
Los Angeles Co.	146	0	70	75	16	306
Orange Co.	61	0	18	16	4	99
Ventura Co.	8	0	4	8	1	20
Riverside Co.	22	0	6	6	1	35
San Bernardino Co.	17	0	6	10	1	34
Victor Valley	6	0	2	4	0	13
Coachella Valley	4	0	3	3	0	10
Total	263	0	109	122	24	517